$$\therefore s_1 = s_2 \tan(x \sin a). \qquad (4)$$

Substituting this in (2) we obtain

$$s_2 = e^{-x \cos a} \cos(x \sin a),$$

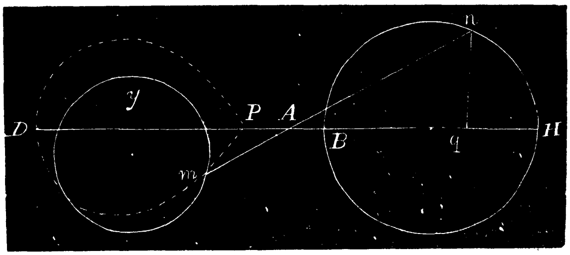
and by (4)

$$s_1 = e^{-x \cos a} \sin(x \sin a).$$

[Mr. Kummell has also sent us a solution of prob. 266, done by a method similar to the above.]

SOLUTION OF PROB. 85 (SEE P. 193, VOL. II) BY PROF. W. P. CASEY.

Let mn be the given line, passing through the given point A, BnH and my the given circles.



Through the given p't A, draw the diameter BH, and make HP and BD each $= mn$, $\therefore$ P and D are given points, and are in the locus of the point m.

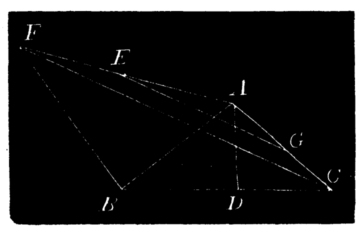
Draw ng perpendicular to BH. Let $Ag = x$, $gn = y$, $BH = d$, $AB = a$, $mn = h$; then $ng^2 = Bg \times gH$, or $y^2 = (x - a)(a + d - x) = (x - a)(c - x)$ (if $c = a + d$), and $y^2 = -x^2 + (a + c)x - ac$. Let $An = r$, $\angle A = \theta$, then $y = r \sin\theta$, $x = r\cos\theta$; $\therefore$ by substitution $r^2 \sin^2\theta = -r^2\cos^2\theta + (a + c)r\cos\theta - ac$, and $r^2 - (a + c)r\cos\theta = -ac$;

$$\therefore r = \tfrac{1}{2}\left\{ (a + c)\cos\theta \pm \sqrt{[(a + c)\cos^2\theta - 4ac]} \right\}.$$

Because $Am = mn - An = h - r$, by giving successive values to θ, and taking the corresponding values of r, the curve, which is the locus of m, will be traced. The curve is an oval, whose axis $PD = BH = d$. The point m is therefore given and the line mn is in position.

[Prof. Casey also discusses the case when $An - Am$ is given, but our space will not permit its insertion.]

CONSTRUCTION OF THE METIAN RATIO BY PROF. CHASE.— Make $AB = 7$; $BC = 8$; $BD = 9$; $DF = 15$; $AE = AC$; AB perpendicular to CD and DF perpendicular to AD, and draw EG parallel to FC. $AF \div AG = 355 \div 113 = 3.14159292+$, π being 3.14159265.



The error is less than one one hundred and sixteen thousandths of one per cent.